

WHAT IS CLAIMED IS:

1. A method of characterizing a duplex nucleic acid molecule, said method  
5 comprising:
- (a) contacting a conducting fluid medium comprising said duplex nucleic acid with a nanopore;
  - (b) applying an electric field to said medium and monitoring current changes through said nanopore resulting from said duplex nucleic acid to obtain a set of observed  
10 data values; and
  - (c) characterizing said nucleic acid based on said set of observed data values; to characterize said duplex nucleic acid molecule.
2. The method according to Claim 1, wherein said set of observed data values is  
15 manipulated in characterizing said duplex nucleic acid.
3. The method according to Claim 2, wherein said duplex nucleic acid is characterized in terms of a signature current blockade profile or portion thereof.
- 20 4. The method according to Claim 1, where said applied electric field is constant.
5. The method according to Claim 1, wherein said applied electric field is pulsed.
6. A method of identifying the presence of a duplex nucleic acid molecule in a  
25 conducting fluid medium, said method comprising:
- (a) contacting said conducting fluid medium with a nanopore;
  - (b) applying an electric field to said medium;
  - (c) monitoring current changes through said nanopore to obtain a set of observed data values; and

(d) determining whether said duplex nucleic acid is present in said conducting fluid medium from said set of observed data values in step (c).

7. The method according to Claim 6, wherein said duplex nucleic acid molecule is a duplex DNA molecule.

8. The method according to Claim 6, wherein said applied electric field is constant.

9. The method according to Claim 6, wherein said applied electric field is pulsed.

10. The method according to Claim 6, wherein said conducting fluid medium includes a plurality of different duplex nucleic acids that differ from each other by sequence.

11. The method according to Claim 6, wherein said determining step (d) is performed by an automated means.

12. The method according to Claim 6, wherein said determining step (d) is manually performed.

13. A method of determining the sequence of a duplex DNA molecule, said method comprising:

- (a) providing a fluid conducting medium comprising said duplex DNA molecule as a molecule that is protected at one end and blunt-ended at the other end;
- (b) producing a single nucleotide overhang at said blunt end of said duplex DNA molecule;
- (c) contacting said fluid conducting medium with a nanopore;
- (d) applying an alternating electric field to said fluid conducting medium and monitoring current changes through said nanopore resulting from said duplex nucleic acid to obtain a set of observed data values;
- (e) removing said single nucleotide overhang from said duplex DNA molecule;

(f) repeating steps (b) to (e) to obtain a collection of sets of observed data values for each different duplex nucleic acid produced from said original duplex nucleic acid, and

(g) determining the sequence of said duplex DNA molecule from said  
5 collection of sets of observed data values;  
to sequence said duplex DNA molecule.

14. The method according to Claim 13, wherein said determining step (g) is determined by an automated data processing means.

10

15. A nanopore device for characterizing a duplex nucleic acid molecule, said device comprising:

an algorithm for characterizing a duplex nucleic acid molecule based on observed current modulations through a nanopore, wherein said algorithm is present on a computer  
15 readable medium.

16. A kit for use in characterizing a duplex nucleic acid molecule, said kit comprising:  
an algorithm for characterizing a duplex nucleic acid molecule based on observed current modulations through a nanopore, wherein said algorithm is present on a computer  
20 readable medium.

17. A kit for use in sequencing a duplex DNA molecule, said kit comprising:  
a first enzyme that produces a single nucleotide overhang comprising duplex DNA molecule from a blunt ended duplex DNA molecule; and  
25 a second enzyme that produce a blunt-ended duplex DNA molecule from a duplex DNA molecule that comprises a single nucleotide overhang.

18. The kit according to Claim 17, wherein said first enzyme is an exonuclease.

30 19. The kit according to Claim 17, wherein said second enzyme is a nuclease.

20. The kit according to Claim 17, wherein said kit further comprises an algorithm for characterizing a duplex nucleic acid molecule based on observed current modulations through a nanopore, wherein said algorithm is present on a computer readable medium.

5

09900403-113101